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IS 3600-9 (1985): Method of Testing Fusion Welded Joints and Weld Metal in Steel, Part 9: Macro and micro examination [MTD 11: Welding General]

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Indian Standard

(Reaffirmed 2003)

METHOD OF TESTING FUSION WELDED JOINTS AND WELD METAL IN STEEL

PART 9 MACRO AND MICRO EXAMINATION

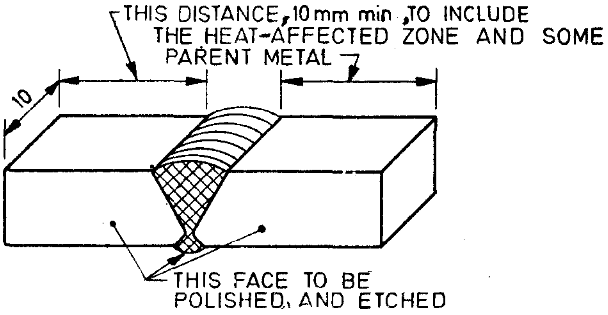
1. Scope – Specifies the procedure for macro and micro examination of welded joints to check the soundness of the joint.

1.1 The macro examination is conducted for revealing certain aspects of the quality of the joint by subjecting it to the corrosive action of an etchant and examining visually or sometimes at a low magnification (usually 10 diameters or less). The micro examination is conducted to study the micro structure at different zones at a magnification generally not less 100 diameters.

2. Separation of Test Specimens — The method employed for cutting and cleaning of the test specimens shall be as given in IS : 7739 (Part 1)-1975 'Code of practice for preparation of metallographic specimen: Part 1 General features'.

3. Size of Test Specimen

3.1 *Macro Test Specimen* — The specimen shall be the full thickness of the material at the welded joint and the excess weld metal and penetration bead shall be left intact. The specimen shall contain a length of the joint of at least 100 mm and shall extend on each side of the weld for a distance that includes the heat-affected zone and some parent metal (*see* Fig. 1).


THIS DISTANCE, 10 mm min, TO INCLUDE THE HEAT-AFFECTED ZONE AND SOME PARENT METAL
10
THIS FACE TO BE POLISHED AND ETCHED

All dimensions in millimetres.

FIG. 1 TEST SPECIMEN FOR MACRO EXAMINATION

3.2 *Micro Test Specimen* — Suitable micro test specimen containing weld, heat affected zone and parent metal shall be extracted from the weld cross section.

4. Surface Preparation — The specimen shall be prepared, polished and etched in accordance with IS : 7739 (Part 1)-1975 and IS : 7739 (Part 5)-1976 'Code of practice for preparation of metallographic specimen: Part 5 Iron and steel and their examination'.

5. Reporting of Results — After examination (*see* **1.1**) a full description of the appearance of the surface under examination and the type and location of any weld flaws in case of macro examination and weld flaws and microstructure in case of micro examination shall be reported.

Note — The standard of defecfs permissible as a result of examination shall be as specified in the appropriate application standard or as agreed to between the contracting parties.

Welding General Sectional Committee, SMDC 14 [Ref : Doc : SMDC 14 (2766)]

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EXPLANATORY NOTE

This standard was first published in 1966 and subsequently revised in 1973 covering various tests on fusion welded joints and weld metal in steel. In view of the experience gained and in order to bring the test and test requirements in line with other international standards published so far, it has been decided to revise the standard in the following parts:

Part 1	Cruciform fillet weld tensile test
Part 2	Beam impact (Charpy V-notch) test
Part 3	Transverse tensile test on butt welds
Part 4	Longitudinal tensile test on cylindrical weld metal test pieces on butt welds
Part 5	Transverse root and face bend test on butt welds (corresponding to ISO 5173-1981)
Part 6	Transverse side bend test on butt welds (corresponding to ISO 5177-1981)
Part 7	Longitudinal root and face bend test on butt welds
Part 8	Nick break test and fillet weld fracture test
Part 9	Macro and micro examination.

In this revision free-bend test has been deleted as the ductility of the weld zone is being assessed more and more by other bend tests. Special tests such as tests for the susceptibility to lamellar tearing, reheat cracking, brittle fracture and creep fatigue will be covered in separate standards.

The main purpose of this standard is to recommend test procedures and test specimens that should be quoted or incorporated in engineering application standards that deal with welded constructions primarily for the qualification of welding procedures and operators. Where differences still exist between application standards, the methods of test given in this standard should be preferred.

A general indication is given of the purpose served by the tests specified in this standard but this standard does not indicate the choice of test method nor a particular application nor the number of specimens to be tested or the repeat tests to be allowed in the event of failure. Such requirements are matters to be dealt with in the particular application standards where they exist or to be agreed between the manufacturer and the purchaser.

It should be realized that variations in welding procedure and the preparation of test specimens can give rise to variations in the test results.

In preparing this part of the standard assistance has been derived from BS : 709-1983 'Destructive testing fusion welded joints and weld metal in steel' issued by British Standards Institution.

In reporting the result of a test on analysis made in accordance with this standard, if the final value, observed or calculated,is to be rounded off, it shall be done in accordance with IS : 2-1960 'Rules for rounding off numerical values (*revised*)'.

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